CLAIMS

1. A system for providing computer guided ablation of tissue of a patient, comprising:
    a. an imaging device for receiving imaging data from a treatment region of a patient, processing said imaging data and providing imaging output data and imaging signals, said imaging output data being available to an operator;
    b. an ablative surgical computer system, comprising:
        i) a guidance module for processing said imaging signals and providing a treatment guidance plan to the operator; and,
        ii) a treatment module for acquiring and processing surgical device output data, for optimally controlling treatment parameters and providing feedback information to the operator based on said treatment guidance plan; and,
    c. a set of surgical devices, said set of surgical devices providing said surgical device output data, said set of surgical devices comprising at least one integrated ablative/temperature sensing device, comprising:
        i) at least one ablative device for providing ablation of said treatment region based on said treatment parameters and operator input; and,
        ii) at least one temperature sensing device integrally attached to said at least one ablative device for acquiring temperature data
        from said treatment region and providing a temperature sensing device output signal, said temperature sensing device output signal being a portion of said surgical device output data,

    wherein said treatment guidance plan is utilized for placing said at least one integrated ablative/temperature sensing device into said treatment region.

2. The system of Claim 1, wherein said at least one temperature sensing device comprises a cannula securely attached to said ablative device and a thermocouple positionable within said cannula, said thermocouple being extendible from said cannula at a desired distance.

3. The system of Claim 1, wherein said at least one temperature sensing device comprises a cannula securely attached to said ablative device and a thermocouple positionable within said cannula, said thermocouple being extendible from a distal portion of said cannula to project outwardly from said cannula at a desired distance to provide temperature profiling.

4. The system of Claim 1, wherein said at least one integrated ablative/temperature sensing device comprises:
    a) a fluid supply line connectable at an inlet section to a source of cryogenic fluid;
    b) a fluid connector assembly securely connected to an outlet section of said fluid supply line for receiving fluid from said outlet section of said fluid supply line; and,
    c) a detachable cryosurgical probe, detachably connectable to said fluid connector assembly, said cryosurgical probe for receiving fluid from said fluid connector assembly and manipulating said fluid to provide suitable temperatures for cryosurgical treatment, said temperature sensing device being integrally attached to said at least one ablative device.

5. The system of Claim 1, wherein said at least one integrated ablative/temperature sensing device comprises:
    a) a fluid supply line connectable at an inlet section to a source of cryogenic fluid;
    b) a fluid connector assembly securely connected to an outlet section of said fluid supply line for receiving fluid from said outlet section of said fluid supply line, said fluid connector defining a main connector assembly axis; and,
    c) a detachable cryosurgical probe, detachably connectable to said fluid connector assembly, said cryosurgical probe for receiving fluid from said fluid connector assembly and manipulating said fluid to provide suitable temperatures for cryosurgical treatment, said detachable cryosurgical probe defining a probe axis, said main connector assembly axis and said probe axis being in a range of 80 degrees and 140 degrees relative to each other, said temperature sensing device being integrally attached to said detachable cryosurgical probe.

6. The system of Claim 1, wherein said at least one integrated ablative/temperature sensing device comprises:
    a) a fluid supply line connectable at an inlet section to a source of cryogenic fluid;
    b) a fluid connector assembly securely connected to an outlet section of said fluid supply line for receiving fluid from said outlet section of said fluid supply line, said fluid connector defining a main connector assembly axis; and,
    c) a detachable cryosurgical probe, detachably connectable to said fluid connector assembly, said cryosurgical probe for receiving fluid from said fluid connector assembly and manipulating said fluid to provide suitable temperatures for cryosurgical treatment, said detachable cryosurgical probe defining a probe axis, said main connector assembly axis and said probe axis being at a relative angle of

about 90 degrees to each other, said temperature sensing device being integrally attached to said detachable cryosurgical probe.

7. The system of Claim 1, wherein said at least one ablative device comprises at least one cryosurgical probe.

8. The system of Claim 1, wherein said at least one ablative device comprises at least one radio frequency electrode.

9. The system of Claim 1, wherein said at least one ablative device comprises at least one laser fiber.

10. The system of Claim 1, wherein said at least one ablative device comprises at least one microwave antenna.

11. The system of Claim 1, wherein said at least one ablative device comprises at least one high-intensity ultrasound transducer.

12. The system of Claim 1, wherein said imaging output data comprises visual imaging output data.

13. The system of Claim 1, wherein said treatment region comprises a region containing cancerous tissue.

14. The system of Claim 1, wherein said treatment region comprises a region containing tissue having an abnormal cell structure.

15. The system of Claim 1, wherein said treatment guidance plan comprises a plan that provides an optimal placement for ablative devices and temperature sensing devices relative to the treatment region.

16. The system of Claim 1, wherein said set of surgical devices further comprises:

an alignment assembly associated with said at least one ablative device for placing said at least one ablative device and said at least one temperature sensing device into said treatment region based on said treatment guidance plan.

17. The system of Claim 1, wherein said treatment module comprises the steps of:
    a) acquiring target temperatures from the operator;
    b) displaying said at least one ablative device and temperature sensing device relative to said treatment region;
    c) starting an ablation cycle based on operator input; and,
    d) ending said ablation cycle based on input from said operator.

18. The system of Claim 12 wherein said at least one ablative device comprises a plurality of cryosurgical probes.

19. The system of Claim 12 wherein said ablation cycle, comprises the steps of:
    a) starting a freeze cycle for a first anterior cryoprobe and a second anterior cryoprobe;
    b) starting a freeze cycle for a first posterior lateral cryoprobe and a second posterior lateral cryoprobe;
    c) starting a freeze cycle for a first posterior medial cryoprobe and a second posterior medial cryoprobe;
    d) operating said plurality of cryoprobes based on said temperature data from said at least one temperature sensing device; and,
    e) informing said operator if all target temperatures have been reached; and,
    f) starting a thaw cycle for said plurality of cryoprobes based on operator input.

20. The system of Claim 14 wherein said step of starting a freeze cycle for said first anterior cryoprobe and said second anterior cryoprobe, comprises the steps of:
    a) turning on said first anterior cryoprobe and said second anterior cryoprobe;
    b) determining if an anterior target temperature has been reached;
    c) operating said first anterior cryoprobe and said second anterior cryoprobe at a maximum rate if an anterior target temperature has not been reached;
    d) operating said first anterior cryoprobe and said second anterior cryoprobe at a substantially zero rate if an anterior target temperature has been reached; and,
    e) determining if said anterior target temperature has reached substantially 0°C.

21. The system of Claim 15 wherein said steps of starting a freeze cycle for said first posterior lateral cryoprobe and said second posterior lateral cryoprobe, and for said first posterior medial cryoprobe and said second posterior lateral cryoprobe, comprises the steps of:
    a) turning on said first posterior lateral cryoprobe and said second posterior lateral cryoprobe and operating them at a maximum rate;

b) determining if a first neurovascular bundle target temperature has been reached;
c) turning off said first posterior lateral cryoprobe if said first neurovascular bundle target temperature has been reached;
d) determining if a second neurovascular bundle target temperature has been reached;
e) operating said second posterior lateral cryoprobe at a substantially zero rate if said second neurovascular bundle target temperature has been reached;
f) turning on said first posterior medial cryoprobe and said second posterior medial cryoprobe after neurovascular temperature readings are substantially close to their target temperatures;
g) operating said first posterior medial cryprobe and said second posterior medial cryoprobe at a power rate in a range of about 15-35%;
h) setting said first posterial medial cryoprobe and said second posterior medial cryoprobe to a substantially zero rate if a Denon Vieller's fascia target temperature has been reached.

22. The system of Claim 12 wherein said ablation cycle, comprises the steps of:
a) starting a freeze cycle for a first anterior cryoprobe and a second anterior cryoprobe;
b) starting a freeze cycle for a first posterior lateral cryoprobe and a second posterior lateral cryoprobe;
c) starting a freeze cycle for a first posterior medial cryoprobe and a second posterior medial cryoprobe;
d) operating said plurality of cryoprobes based on said temperature data from said at least one temperature sensing device; and,
e) automatically controlling said freeze cycles for all of said above cryoprobes based on said target temperatures and said temperature data; and,
f) starting a thaw cycle for said plurality of cryoprobes based on user input.

23. The system of Claim 12 wherein said ablation cycle, comprises the steps of:
a) starting a freeze cycle for a first anterior cryoprobe and a second anterior cryoprobe;
b) starting a freeze cycle for a first posterior lateral cryoprobe and a second posterior lateral cryoprobe;
c) starting a freeze cycle for a first posterior medial cryoprobe and a second posterior medial cryoprobe;
d) operating said plurality of cryoprobes based on said temperature data from said at least one temperature sensing device; and,

e) automatically controlling said freeze cycles for all of said above cryoprobes based on said target temperatures and said temperature data; and,

f) starting a thaw cycle for said plurality of cryoprobes based on said temperature data.

24. The system of Claim 1, wherein said treatment module automatically controls said at least one ablative element based upon a temperature sensing device output signal.

25. A method for providing computer guided ablation of tissue of a patient, comprising the steps of:

a) receiving imaging data from a treatment region of a patient, processing said imaging data and providing imaging output data and imaging signals, said imaging output data being available to an operator;

b) processing said imaging signals and providing a treatment guidance plan to the operator;

c) acquiring and processing surgical device output data, for optimally controlling treatment parameters and providing feedback information to the operator based on said treatment guidance plan;

d) operating a set of surgical devices, said set of surgical devices providing said surgical device output data, said set of surgical devices comprising at least one integrated ablative/temperature sensing device, said step of operating a set of surgical devices, comprising:

i. operating at least one ablative device integrally attached to said at least one ablative device for providing ablation of said treatment region based on said treatment parameters and operator input; and,

ii. operating at least one temperature sensing device for acquiring temperature data from said treatment region and providing a temperature sensing device output signal, said temperature sensing device output signal being a portion of said surgical device output data,

wherein said treatment guidance plan is utilized for placing said at least one integrated ablative/temperature sensing device into said treatment region.

26. The method of Claim 20, wherein said step of operating at least one ablative device comprises operating at least one cryosurgical probe.

27. The method of Claim 20, wherein said step of operating at least one ablative device comprises operating at least one radio frequency electrode.

28. The method of Claim 20, wherein said step of operating at least one ablative device comprises operating at least one laser fiber.

29. The method of Claim 20, wherein said step of operating at least one ablative device comprises operating at least one microwave antenna.

30. The method of Claim 20, wherein said step of operating at least one ablative device comprises operating at least one microwave antenna.

31. The method of Claim 20, wherein said step of receiving imaging output data comprises receiving visual imaging output data.

32. The method of Claim 20, wherein said step of providing a treatment guidance plan comprises:

    a) acquiring target temperatures from the operator;
    b) displaying said at least one ablative device and temperature sensing device relative to said treatment region;
    c) starting an ablation cycle based on operator input; and,
    d) ending said ablation cycle based on input from said operator.

33. The method of Claim 27, wherein said step of starting an ablation cycle, comprises:
    a) starting a freeze cycle for a first anterior cryoprobe and a second anterior cryoprobe;
    b) starting a freeze cycle for a first posterior lateral cryoprobe and a second posterior lateral cryoprobe;
    c) starting a freeze cycle for a first posterior medial cryoprobe and a second posterior medial cryoprobe;
    d) operating said plurality of cryoprobes based on said temperature data from said at least one temperature sensing device; and,
    e) informing said operator if all target temperatures have been reached; and,
    f) starting a thaw cycle for said plurality of cryoprobes based on operator input.

34. The method of Claim 28, wherein said step of starting a freeze cycle for said first anterior cryoprobe and said second anterior cryoprobe, comprises:
    a) turning on said first anterior cryoprobe and said second anterior cryoprobe;

b) determining if an anterior target temperature has been reached;

c) operating said first anterior cryoprobe and said second anterior cryoprobe at a maximum rate if an anterior target temperature has not been reached;

d) operating said first anterior cryoprobe and said second anterior cryoprobe at a substantially zero rate if an anterior target temperature has been reached; and,

e) determining if said anterior target temperature has reached substantially 0°C.

35. The method of Claim 20; wherein said step of providing a treatment guidance plan comprises automatically controlling said at least one ablative element based upon a temperature sensing device output signal.